Rare Species Surveys of the Manitoba Conservation Data Centre, 2005

Manitoba Conservation Data Centre MS Report 06-01

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Images:

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Cover image: Iowa golden-saxifrage (*Chrysosplenium iowense*), a globally vulnerable species that has been collected from Duck Mountain Provincial Park and Porcupine Provincial Forest and reported from Riding Mountain Provincial Park.

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Executive Summary

The following ten rare plant species were targeted for surveys by the Manitoba Conservation Data Centre in 2005:

Bloodroot (*Sanguinaria canadensis*)	Provincially rare
Buffalo grass (*Buchloe dactyloides*)	Nationally Threatened
Culver's-root (*Veronicastrum virginicum*)	Provincially Threatened
Eastern swamp saxifrage (*Saxifraga pensylvanica*)	Nationally very rare
Western ironweed (*Vernonia fasciculata*)	Nationally very rare
Hairy prairie-clover (*Dalea villosa*)	Nationally Threatened
Iowa golden saxifrage (*Chrysosplenium iowense*)	Globally vulnerable
Riddell's goldenrod (*Oligoneuron riddellii*)	Provincially Threatened
Small white lady's-slipper (*Cypripedium candidum*)	Nationally Endangered
Western silvery aster (*Symphyotrichum sericeum*)	Nationally Threatened

Previously known occurrences of eight of the above species were remapped and updated with current information on population status. Eastern swamp saxifrage and western ironweed were not found at any of the searched locations in 2005. New occurrences of bloodroot, Culver's-root and small white lady's-slipper were found. In addition to the targeted species new occurrences were documented for 20 rare and uncommon species.

Special survey and stewardship initiatives in 2005 included mapping and collection of negative data. Forty-two sites were mapped at which no rare species were found or a repeat visit is needed for proper data collection. Presentations on the identification of rare plant species in road allowances were delivered to the Industrial Vegetation Management Association and the Manitoba Weed Supervisors Association, and a map of rare species occurrences along road allowances was produced for a rural municipality along with mitigation recommendations for the protection of five listed plant species.

Stewardship and recovery needs specific to rare plants in Manitoba are outlined. Efforts to prioritize sites for protection, standardize monitoring, develop beneficial management practices, and increase awareness and communication among government agencies are identified as key issues to be addressed.

Acknowledgements

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Introduction

This field report summarizes the results of Manitoba Conservation Data Centre (CDC) surveys for rare and uncommon plants in 2005. The CDC collects and manages information on Manitoba's plant and animal species. This information is used to determine the rarity and requirements of each species, and is provided to stakeholders involved with land use planning and management. The ten plant species targeted for surveys in 2005 include species listed under Canada's Species at Risk Act and Manitoba's Endangered Species Act, species deemed to be high priorities by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and provincially rare species. Surveys were focussed on areas of the province lacking up to date rare species information. In addition to species targeted for comprehensive surveys, information was collected on other rare and uncommon species of interest as opportunities arose. Increased effort was concentrated on documenting negative data for sites searched unsuccessfully and outreach was focussed on increasing awareness of rare plant species in road allowances.

Methods

Known rare plant occurrences to be monitored in 2005 were determined by consulting the CDC's database and herbarium records. Location information and the date that occurrences had previously been observed were taken into consideration. Other areas that had potentially suitable habitat for the targeted species were determined based on GIS (geographic information system) themes maintained by Manitoba Conservation such as aerial photographs, satellite imagery and themes containing information on land use, soils and elevation. Landowners or managers were contacted prior to surveys where required.

Each rare plant occurrence was mapped in the field using a GPS (global positioning system) equipped hand held computer. A plant occurrence refers to a population separated by less than one kilometre from an occurrence of the same species, or less than two kilometres if intervening habitat is suitable. Information recorded for each occurrence included specific directions, plant abundance, habitat characteristics, threats and other relevant biological and ecological information. Photographs were taken and plant specimens were collected and deposited at the University of Manitoba and Manitoba Museum herbariums when identification confirmation was required. Information collected for targeted species and other species of interest was entered into the CDC's GIS and associated database (Biotics 4.03). Information on negative search results was entered into a stand alone GIS (Arcview 3.2a). Landowners and managers with rare species occurring on their property were provided with survey results and additional information on the species. Scientific names follow published volumes of Flora of North America and Kartesz (1999).

Results

A total of 144 sites were surveyed for 30 rare and uncommon species. Fifty-one of these sites were privately owned land parcels (Table 1). Forty-one previously known occurrences were monitored and 28 new occurrences were documented. Results of surveys for each of the ten targeted rare species are summarized below, followed by notes on other species of interest that were surveyed. The global, national and subnational (provincial) conservation status ranks are given for each species (see Appendix 1 for definitions of these ranks). Relevant Canadian General Status (GS) ranks are also given for species that have more up to date assessment information available (see Appendix 2). Survey results are followed by information on special survey and stewardship initiatives undertaken in 2005.

Table 1. Summary of 2005 rare species survey results.

Common Name	Scientific Name	Listed by the MB ESA or SARA*	Sites Surveyed**	Private Land Parcels Surveyed	Known Occurrences Monitored	New Occurrences Documented	Source Features Digitized***
Targeted Surveys for Rare Species							
Bloodroot	*Sanguinaria canadensis*		5	1	1	1	2
Buffalo grass	*Buchloe dactyloides*	✓	8	8	1	2	16
Culver's-root	*Veronicastrum virginicum*	✓	6	0	3	2	14
Eastern swamp saxifrage	*Saxifraga pensylvanica*		5	0	0	0	0
Fascicled ironweed	*Vernonia fasciculata*		23	0	3	0	0
Hairy prairie-clover	*Dalea villosa*	✓	20	13	10	0	151
Iowa golden saxifrage	*Chrysosplenium iowense*		8	0	1	0	2
Riddell's goldenrod	*Solidago riddellii*	✓	12	0	11	0	53
Small white lady's-slipper	*Cypripedium candidum*	✓	20	17	4	1	20
Western silvery aster	*Symphyotrichum sericeum*	✓	7	4	4	0	10
Other Rare and Uncommon Species Surveyed							
Dwarf water-lily	*Nymphaea leibergii*		2	0	0	0	0
English sundew	*Drosera anglica*		1	0	0	1	2
Geyer's spurge	*Chamaecyse geyeri*		2	1	0	2	2
Large-fruited parsley	*Lomatium macrocarpum*		1	1	0	1	1
Liverleaf	*Hepatica nobilis*		1	0	0	0	0
Marsh alkali aster	*Almutaster pauciflorus*		2	0	0	2	2
Northern Prairie Skink	*Eumeces septentrionalis*		1	0	0	1	1
Northern spikemoss	*Selaginella selaginoides*		1	0	0	1	1
Pincushion cactus	*Escobaria vivipara*		1	1	0	1	1
Prairie lungwort	*Mertensia lanceolata*		1	1	0	1	1
Sand bluestem	*Andropogon hallii*		2	2	0	2	2
Schweinitz's flatsedge	*Cyperus schweinitzii*		2	0	1	1	2
Slender agalinis	*Agalinis tenuifolia*		3	0	0	3	3
Smooth cliff-brake	*Pellaea glabella*		1	0	1	0	1
Tussock sedge	*Carex stricta*		1	0	0	1	1
Virginia virgin's bower	*Clematis virginiana*		1	0	0	1	1
White beak sedge	*Rhynchospora alba*		1	0	0	1	N/A
White turtlehead	*Chelone glabra*		1	0	1	0	2
Wild ginger	*Asarum canadense*		4	1	0	2	N/A
Yellow umbrella-plant	*Eriogonum flavum*		1	1	0	1	1
Totals	30	6	144	51	41	28	292

* MB ESA=Endangered Species Act, SARA=Canada's Species at Risk Act.

** Sites are defined as discrete sampling locations. A single quarter-section was considered one site, unless fragmented by multiple ownership. Each owner unit within a single quarter-section was considered a separate site. On large crown parcels covering many sections, each discrete 'stop' is was considered a site. When species were not observed, site information was entered in a negative results database.

***Includes features created or modified based on 2005 field work, as well as other conspecific features updated to current data standards in 2005.

Part 1: Surveys for Targeted Rare Plants

Bloodroot (*Sanguinaria canadensis*)

G5, NNR, S2

Bloodroot is the only native representative of the poppy family (family Papaveraceae) to occur in Manitoba. It is one of the first woodland flowers to appear in the spring, blooming in early to mid-May depending on weather. A single wavy lobed leaf unfolds to release a single white flower. The common name comes from its bright red sap. It was used traditionally by Native Americans for a variety of medicinal uses as well as in ceremonial face paint (Flora of North America Editorial Committee 1997).

Bloodroot is widespread, frequently occurring in rich, moist hardwood forests across the eastern United States and south-eastern Canada. However, it is expected to be declining in abundance in some areas due to habitat conversion, development, and collecting for medicinal and other uses (NatureServe 2006). In Manitoba, bloodroot is most commonly found in riparian areas of the south-east and in the Pembina Hills.

Status & Threats

Bloodroot is considered rare in Manitoba. It reaches the northwestern limit of its range in south-central Manitoba where it is known from relatively few locations (Fig. 1). Its General Status rank is Secure in Ontario, Quebec, New Brunswick, Nova Scotia and Canada as a whole (CESCC, *in prep.*) It is also considered secure globally (NatureServe 2006). Conversion of native woodlands for agriculture or development is a potential threat to bloodroot in Manitoba.

Data Collected in 2005

Bloodroot was searched for at four sites on May 11, 2005. It was verified as extant at one previously known site near the Whitemouth River at the Manitoba Forestry Association's Sandilands Forest Centre south of Hadashville. It was not re-located at another previously mapped site but the herbarium label indicates that it was likely mapped at the wrong location and is referable to the same populations as above. A new population consisting of four patches of bloodroot was found on private land further north along the Whitemouth River. It was also searched for along portions of the Whitemouth Ski Trail and at a location near Whitemouth Falls but no bloodroot was found.

Recommendations

Future Research

There are several historical records of bloodroot that remain to be verified as extant populations. Location information on herbarium labels is quite vague for some of these. Additional occurrences of bloodroot likely exist along the Whitemouth River, in remnant riparian forest.

Management

Although these sites should be protected, active management is not necessary at the sites visited in 2005. The Manitoba Forestry Association includes bloodroot in its educational tours (Reimer and Hamel 2003).

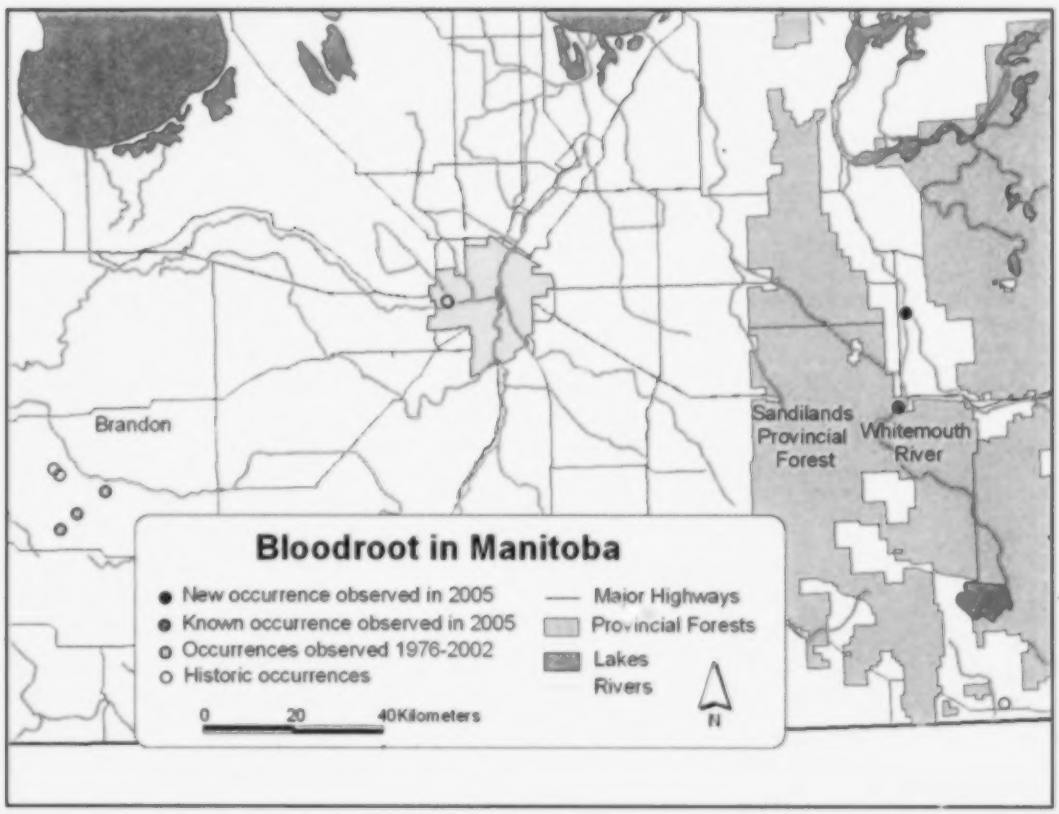


Figure 1. Occurrences of bloodroot (*Sanguinaria canadensis*) in Manitoba.

Buffalo Grass (*Buchloe dactyloides*)

G4G5, N1, S1, SARA: Threatened

Buffalo grass (family Poaceae), is the only species in the genus *Buchloë*. It is a sod-forming grass, spreading by creeping stems to form clones up to 2 m across (Harms 1997). Male and female flowers are borne on separate plants. Female flower clusters are 2-5 cm high and mostly concealed by the foliage. The female flowers are enclosed by a bur-like structure that disperses intact. Male flower clusters, at the tops of slender culms mostly less than 12 cm high, surpass the foliage. The male plants resemble stunted specimens of blue grama grass (*Bouteloua gracilis*), with curled leaf blades and short one-sided spikes.

In Canada, buffalo grass grows in clay to clay-loam soils (Harms 1997). It occurs within the Souris and Blind River Valleys in Manitoba, where it is associated with gleyed black solonetzic soils (Reimer and Hamel 2002). It is restricted to areas of unbroken native pasture. Grazing and moderate trampling may be required to reduce competition from other grasses (Harms 1997).

Status & Threats

Buffalo grass is protected in Manitoba under federal legislation as a Threatened species. Its distribution in Canada is extremely limited, occurring only within the Souris River Valley of Manitoba and Saskatchewan and the Blind River Valley (Manitoba). In Manitoba, the species is known from a 17 km length of the Souris River Valley and a contiguous 12 km length of the Blind River Valley (Fig. 2). Known patches occupy a total of less than 516 ha within Manitoba, and are limited to valley floors and low slopes on portions of 38 quarter sections and adjacent undeveloped road allowances. The species typically occurs in a 50-650 m wide band running parallel to the river. All occurrences but one lie on privately owned land and adjacent road allowances.

Large-scale alterations in water drainage or flow resulting in the prolonged inundation of either valley could negatively affect buffalo grass populations. The single greatest immediate threat may be the rapid expansion of leafy spurge in the Blind and Souris River Valleys. Changes from current land use could threaten buffalo grass in Manitoba.

Data Collected in 2005

Surveys were focussed on quantifying the spatial extent of buffalo grass on parcels of land previously identified as supporting the species. Past surveys by the Mixed-grass Prairie Inventory and the Manitoba Conservation Data Centre (summarized in Reimer et al. 2003) noted the presence of buffalo grass on a number of privately-owned land parcels, but did not include complete mapping of the species extent. In 2005, staff of the CDC resurveyed a number of these parcels and utilized GPS-equipped handheld computers to map distinct patch boundaries.

After obtaining access permission, seven privately-owned land parcels were surveyed June 28-30. An exceptionally rainy June, combined with high water levels on the Souris River, resulted in shallow flooding

over much of the valley floor. Reimer et al. (2003) noted that buffalo grass patches seemed to be closely associated with slight elevational rises corresponding to the maximum normal extent of over-bank flooding, and this was supported by observations in 2005. Below this elevation the vegetation community was dominated by alkali grass (*Distichlis stricta*) and other plants typical of solonetzic soils; buffalo grass patches were rarely encountered in this community.

Leafy spurge has become the dominant plant in portions of the Souris River Valley.

A recent and rapid expansion of leafy spurge cover was evident at a number of surveyed sites. At one site, for example, surveyors in 2003 noted "leafy spurge is occurring in a few patches on the ridge, near the base; could become more of a problem" (Mixed-grass Prairie Inventory, unpublished data). In 2005, leafy spurge was found to be the dominant species over much of the lower slopes on this same parcel.

One additional private land parcel was surveyed on September 20, but spatial delimitation of buffalo grass patches was not possible due to a lack of reproductive structures on most buffalo grass clones.

Recommendations

Future Research

A number of native prairie-dominated land parcels within the known Manitoba range of buffalo grass have yet to be surveyed. Surveys of these parcels may reveal additional patches of the species and give a more complete picture of buffalo grass abundance in Manitoba. The aerial extent mapping conducted in 2005 should be expanded to other quarter sections where the area of occupancy of buffalo grass is not well known. Given the species' clonal nature, measuring patch size change over time may be the most effective method of monitoring the abundance of Manitoba's buffalo grass.

The Souris River Valley near Coulter.

Additional buffalo grass sites outside of the Souris and Blind River Valleys are unlikely to be discovered as the species' preferred habitat and soil type are quite limited (Reimer et al. 2003). Mixed-grass Prairie Inventory field staff have conducted surveys of native prairie throughout southwestern Manitoba since 1996, but no additional buffalo grass populations have been discovered.

Management

Control of what appears to be a rapidly expanding leafy spurge population in the Souris and Blind River Valleys may be critical. Interested landowners should be encouraged to control the species in a manner that does not damage buffalo grass populations. The Manitoba Leafy Spurge Stakeholders Group and the Canada-Manitoba Farm Stewardship Program both offer landowners technical (and in case of the latter organization, financial) assistance with leafy spurge control. Public awareness programs, conservation agreements, and programs that promote sustainable grazing will also aid long-term buffalo grass conservation.

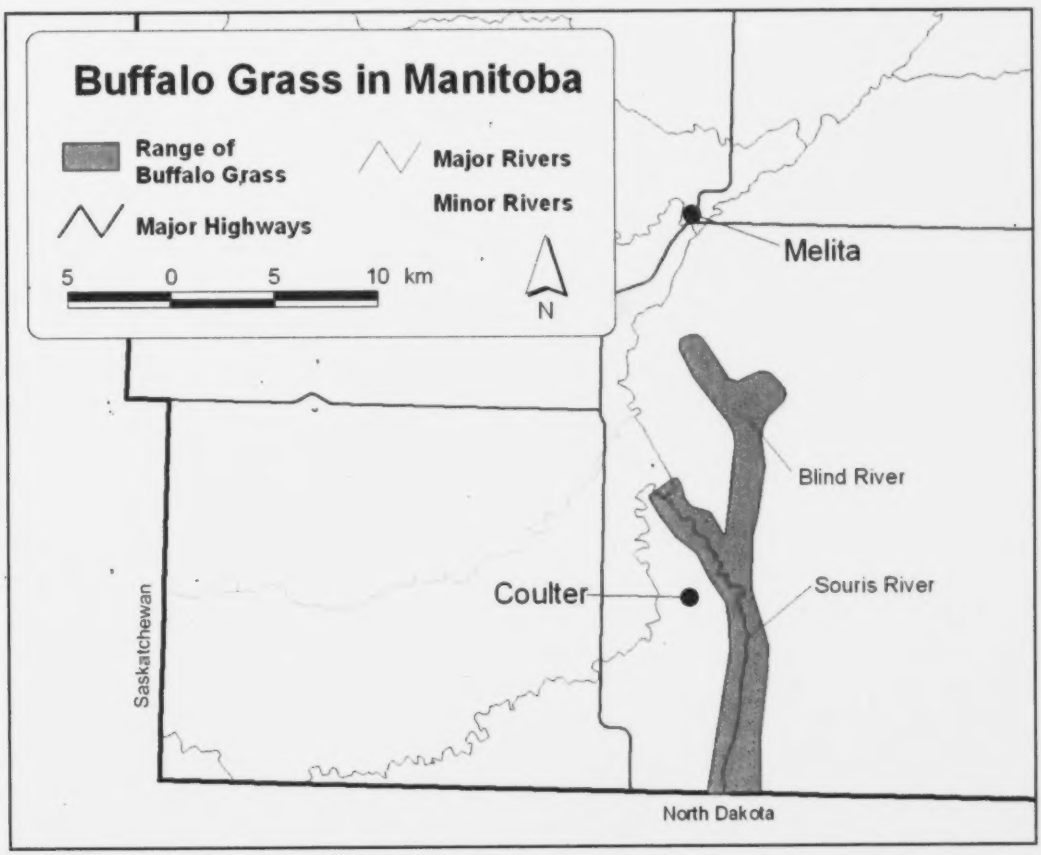


Figure 2. The range of buffalo grass (*Buchloe dactyloides*) in southwestern Manitoba. The species occurs discontinuously within the shaded area.

Culver's-root (*Veronicastrum virginicum*)

G4, N2, S1, MESA: Threatened

Culver's-root (family Scrophulariaceae) is a tall perennial, occasionally growing to a height of 2 m. The leaves are spaced along the stem in whorls of three to nine. They are lance-shaped with sharply toothed edges. The small white-to-pinkish tubular flowers have two protruding anthers and are crowded on a slender, spike-like inflorescence from 5-20 cm long. Culver's-root blooms from July to August.

Culver's-root ranges from Manitoba south to Texas and eastwards to the coast (NatureServe 2006). In Canada it is native to Manitoba and Ontario. In Manitoba it typically grows at edges of shrubs and aspen or oak woods. It is found in partially shaded, small wooded areas as well as in small prairie openings. It prefers moist, calcareous sandy loam soil. Many of Manitoba's remaining populations are found along roads and fence lines in areas dominated by agriculture.

Status & Threats

Culver's-root is listed as Threatened under the Manitoba *Endangered Species Act* and is considered rare in Ontario and Canada as a whole. In the United States it is tentatively considered apparently secure. Globally it is considered apparently secure. Although common in parts of its range populations are low or declining in some areas (NatureServe 2006).

In Manitoba much of Culver's-root habitat has been lost or fragmented by conversion to agriculture. Currently it is only known to occur in an area less than 400 km^2 (Fig. 3) within the Rural Municipality (RM) of Franklin and in and around the Tall Grass Prairie Preserve in the RM of Stuartburn. Most populations are along road allowances and could be threatened by maintenance activities such as mowing and herbicide spraying. Browsing by deer may also impact some of the smaller populations.

Data Collected in 2005

In 2004 all except for two known occurrences within the RM of Franklin were visited (Hamel and Foster 2005). On August 12, 2005 the two remaining occurrences were verified as extant. One occurrence had decreased from 30 to 15 stems and may have been impacted by mowing. The other had 72 stems, several of which had been browsed.

An occurrence in the RM of Hanover, suspected to have been extirpated, was also searched. It was discovered in 1997 when it had 46 stems, some of which had been browsed. In 1998 four stems were counted and in 2002 no stems were found. Culver's root was not found on August 12, 2005 and has likely been extirpated from this site.

On September 1 two new occurrences of Culver's-root were found and an additional known occurrence was updated. One of the new occurrences consisted of a single stem in a ditch adjoining cultivated land. The other had 22 stems on both sides of the road in open grassy areas as well as in shaded woods. Culver's root

was verified as extant at the known occurrence although some cattle had escaped, trampling the area.

Recommendations

Future Research

Culver's root abundance has been shown to decline under conditions of high deer density (Anderson et al. 2005). Considering edge habitats are preferred by both Culver's root and white tailed deer, management aimed at decreasing the threat of browsing at some sites, such as those at the Tall Grass Prairie Preserve, could be explored. Browsing may have contributed to the extirpation of an occurrence in the RM of Hanover where browsed stems and deer beds had been observed in 1997. Sweet clover (*Melilotus alba*), which provides forage for white tailed deer, was very abundant at a site visited in 2004 from which Culver's root may also have been extirpated (Table 2). Future surveys of Culver's root should document its tolerance for open, edge and forested habitat.

Management

Due to the high proportion of roadside occurrences, those responsible for road maintenance should be notified. Drainage projects are a concern in this wet area, particularly considering the high precipitation received in recent years. Any measures taken to reduce the chance of browsing would likely benefit Culver's-root populations. A Species at Risk fact sheet for Culver's root was been produced in 2006. Outside of the Manitoba Tall Grass Prairie Preserve, there are no protected occurrences of Culver's-root in the province. Efforts to secure at least one additional population would be prudent.

Table 2. The current status of Culver's root (*Veronicastrum virginicum*) occurrences in Manitoba.

Survey Site	First Observed	Last Observed	Last Surveyed	Notes
Occurrences recently verified as extant				
RM of Franklin	2004	2004	2004	Road allowance - six stems.
RM of Franklin	2003	2004	2004	Road allowance, plants browsed.
RM of Franklin	1998	2004	2004	Road allowance and private land.
RM of Franklin	1997	2004	2004	Portion of population lost in 1998 (railbed levelling).
RM of Franklin	2005	2005	2005	Road allowance - one stem.
RM of Franklin	2005	2005	2005	Road allowance with Riddell's goldenrod and great plains ladies' tresses.
RM of Franklin	1999	2005	2005	Road allowance near Green Ridge.
RM of Franklin	1998	2005	2005	Undeveloped road allowance and private land. Vulnerable to drainage projects.
RM of Franklin	1989	2005	2005	Portions of population lost in 1998 and 2002 (railbed levelling, habitat clearing). Trampled by escaped cattle in 2005.
Tall Grass Prairie Preserve	1994	2005	2005	Monitored by Tall Grass Prairie Preserve staff.
Tall Grass Prairie Preserve	1992	2005	2005	Monitored by Tall Grass Prairie Preserve staff.
Tall Grass Prairie Preserve	1988	2005	2005	Monitored by Tall Grass Prairie Preserve staff.
Occurrences that are possibly extirpated				
RM of Franklin	1997	2002	2004	Road allowance - 16 stems in 2002. Weedy.
Extirpated occurrences				
RM of Hanover	1997	1998	2005	Road allowance. Not observed in 2002 or 2005.
Historic occurrences				
RM of Franklin	1927	1927?	?	Exact location unknown but may be the same population as site 6 which is less than 2 1/2 km south of Green Ridge.

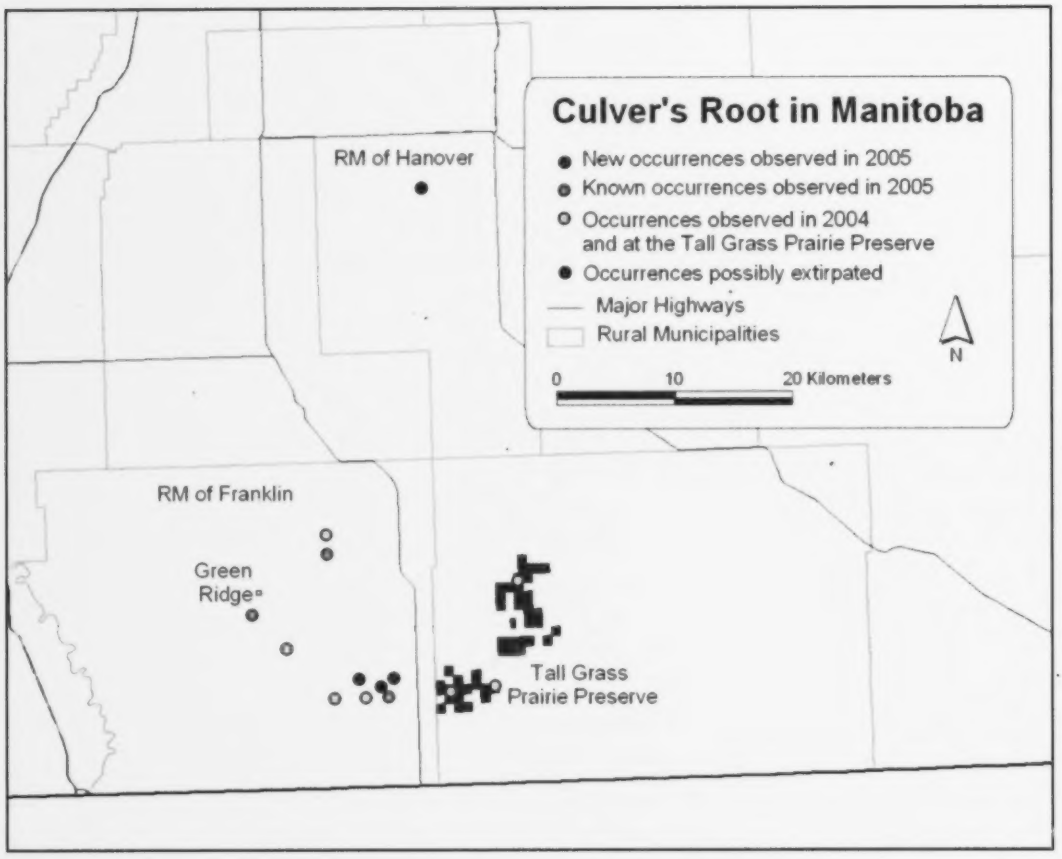


Figure 3. Occurrences of Culver's root (*Veronicastrum virginicum*) in Manitoba.

Eastern swamp saxifrage (*Saxifraga pensylvanica*)

G5, N1, S1

Swamp Saxifrage (family Saxifragaceae) is a perennial herb with a thickened rootstock, and is characterised by a basal rosette of lance-shaped to broadly-elliptic leaves that are up to 20 cm long including the reddish leaf stalks (US Department of Agriculture, no date). Flowering stems that are up to 1 m tall arise in June and support elongated inflorescences of small greenish-white flowers. Fruits are a pair of beaked pods up to 4 mm long.

The species' range is limited to the northeastern United States and adjacent areas of Ontario and southeastern Manitoba. A disjunct population occurs in east-central Saskatchewan. Across its range, the species tends to occur in wet prairies and meadows, but also in mineral-rich swamps. In Manitoba, the species is only known from the extreme southeastern corner.

Status & Threats

Swamp saxifrage is considered very rare in Canada and in the three provinces in which it occurs. Its Canadian range is limited to the extreme southeastern corner of Manitoba, the Rainy River District of Ontario, and the Pasquia Hills of Saskatchewan (Steve Porter, Saskatchewan CDC; Al Harris, Northern Bioscience, pers. comms.). The Committee on Endangered Wildlife in Canada (COSEWIC) considers preparation of a status report for this species to be a priority (Erich Haber, COSEWIC Plants Subcommittee Chair, pers. comm.).

Populations in Ontario appear to tolerate some disturbance, and have been observed growing adjacent to trails and drainage ditches (Al Harris, Northern BioScience, pers. comm.). Logging may be a threat to some Ontario populations (*ibid.*).

Data Collected in 2005

The presence of swamp saxifrage in the Pasquia Hills of Saskatchewan suggests that the species may not be limited to the southeastern corner of Manitoba. Surveys in 2005 were focussed on areas in north-central Manitoba with physiognomic and habitat features resembling those of the southeastern Manitoba swamp saxifrage population surveyed in 2004 (Hamel & Foster 2005). Potential survey sites were identified through a GIS analysis that intersected cedar-containing stands (as identified in the provincial Forest Resource Inventory) with landscape-scale elevational gradients and water features indicating groundwater seepage. The majority of identified potential survey sites were closely associated with The Pas End Moraine, which extends from Long Point in the north basin of Lake Winnipeg north and west towards the town of The Pas (Teller 1975).

Five stands were visited on July 12 and 13 (Fig. 4). While vegetational makeup and microtopography similar to that observed in southeastern Manitoba characterized portions of these stands, no swamp saxifrage was observed.

Recommendations

Future Research

The only extant population known in Manitoba was observed in a mineral-rich cedar swamp near the shoreline of Lake of the Woods (Hamel & Foster 2005). It is also known to occur in black spruce swamps in Ontario (Al Harris, Northern Bioscience, pers. comm.) and on mossy hummocks in shrub birch and willow fens in Saskatchewan (Steve Porter, Saskatchewan CDC). Similar habitat may exist in other places near the shoreline of Lake of the Woods in Manitoba. Further surveys for swamp saxifrage should occur along The Pas End Moraine. Promising, but difficult to access, cedar swamps occur along the north shore of Long Point (Jack Dubois, Director, Wildlife and Ecosystem Protection Branch, Manitoba Conservation). Other potential survey areas include cedar-dominated fens in the Hecla Island/Grindstone area and the Saskatchewan River Delta.

A black spruce-Eastern white cedar stand in a seepage area on The Pas End Moraine.

Management

Wetlands dominated by Eastern white cedar are a provincially rare vegetation type in their own right (G5, S2). The cedar stands of The Pas End Moraine are the most northwesterly in North America, and are disjunct from the species' main distribution in eastern Canada (Tardif & Stevenson 2001). These stands may thus represent a genetically distinct population adapted to survive at the species' environmental limits. Cedar has the capacity to reach relatively old ages, as compared to many Manitoba tree species; cedar trees on The Pas End Moraine have been dated in excess of 285 years old (Tardif & Stevenson 2001). Land managers should avoid disturbance or destruction of cedar stands occurring in groundwater seepage areas.

Proposed cottage developments along the shore of Lake of the Woods and near Moose Lake should be screened for their impact on known and potential swamp saxifrage populations, and mitigative actions required.

The rarity of swamp saxifrage, both provincially and nationally, suggest that a formal assessment by COSEWIC and the Manitoba Endangered Species Advisory Committee is appropriate.

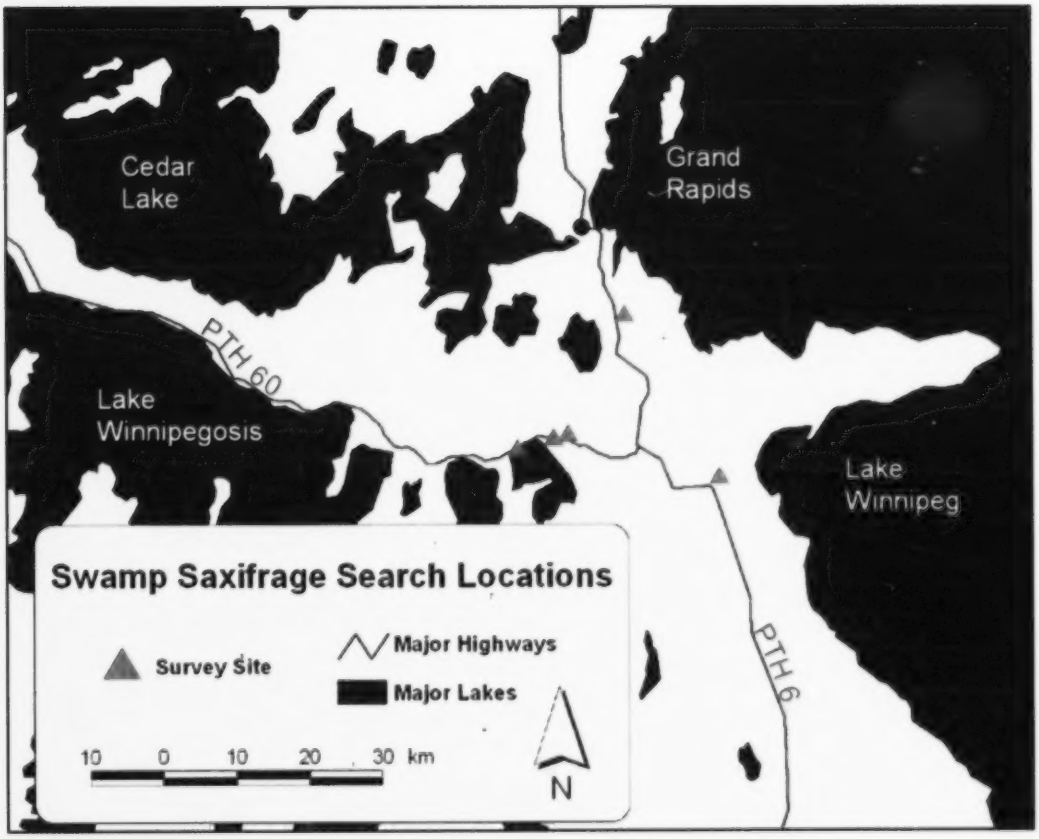


Figure 4. Survey sites for swamp saxifrage in north-central Manitoba. Swamp saxifrage was not observed.

Western ironweed (*Vernonia fasciculata* ssp. *corymbosa*)

G5[1], N1, SH

Western ironweed (family Asteraceae) is a smooth, herbaceous perennial with single or clustered stems which stand 3-6 dm tall (NatureServe 2006). The stems are often reddish or purple and bear alternately arranged leaves. The inflorescence is a flat-topped cluster of composite flower heads. Each head consists of 10-26 disk flowers which are bisexual and all alike; the tubular purple corollas are 9-11 mm long and are encircled by an inner pappus of slender brownish to purplish bristles and an outer pappus of scales. Flowering occurs July to September (Nearctica 2003), but all Manitoba specimens have been collected in August. The fruits are hairless or nearly hairless.

Western ironweed is found in wet prairies and moist prairie depressions in the Great Plains, as well as east to Massachusetts and south to Kentucky and Alabama. Manitoba's only subspecies (corymbosa) is limited to the northern Great Plains, from Kansas north to southern Manitoba. The species often grows with prairie cordgrass (*Spartina pectinata*) (National Park Service 2004).

Status & Threats

Western ironweed is a nationally rare plant known only from Saskatchewan and Manitoba. It is a candidate for COSEWIC Species Status Report preparation (Bruce Ford, Vascular Plants subcommittee, pers. comm.). In Saskatchewan the species is considered historic. In Manitoba, the species has not been observed since 1958. Three historic populations are known; two along the riverbank of the Rat River near Otterburne and one in a grassy ditch west of Morris (Fig. 5). The large, showy nature of the species and its presence in a relatively populated portion of the province suggests that, if the species remains extant in Manitoba, it is likely rare as opposed to overlooked. The length of time since last observation makes a meaningful assessment of threats impossible. Western ironweed is the only member of its genus in Manitoba.

Data Collected in 2005

Surveys focused on relocating and surveying the sites of historic observations and on surveying nearby riparian and moist prairie habitats. The species was not observed in 2005.

The location of the Otterburne populations (as described on herbarium labels originally prepared by Bernard (1954) and Boivin, Perron and Bernard (1958)) were visited on August 12. One of the locations was characterized by eastern deciduous riparian forest which had until very recently been under flood water. The invasive weed burdock (*Arctium* sp.) appeared to dominate the understory, but most understory development was limited due to flooding. The other Otterburne population appeared to lie upon private land and so was not surveyed. A number of other accessible riparian areas along the Rat River and other southeastern Manitoba streams were surveyed in late summer; limited vegetation development due to summer flooding was observed at most locations.

[1] sp. ranked G5, ssp. corymbosa ranked G5T3T5

On August 24 an attempt was made to relocate the population located west of Morris 'in a grassy ditch' where a specimen was collected by Scoggan in 1953 (Scoggan 1957). The ditch is now dominated by non-native grass species. An underground municipal water system has been installed within the ditch along one side of the roadway, most likely since 1953. Major physical disturbance would have accompanied the installation of this pipe. Ditches west of Morris and in the area between Morris, Aubigny, and Otterburne were surveyed by driving slowly and stopping where native vegetation or species similar to western ironweed were observed. Most ditches appeared to be regularly hayed, and at most locations non-native brome grass (*Bromus* sp.) was dominant, with lower areas dominated by cattails (*Typha* sp.).

Potential habitat was encountered within a mile of what may be the original Morris collection site. An approximate 1.5 ha prairie cordgrass (*Spartina pectinata)*-dominated grassland was observed adjacent to riparian willow and common reed (*Phragmites australis*) stands along Shannon Creek. High water levels seemed to have delayed or prevented the development of many herbaceous species. The area could not be closely surveyed due to an intense lightning storm. This patch of prairie represents the best potential habitat seen west of Morris.

Western ironweed was not encountered while surveying for Riddell's Goldenrod in six fen-like tallgrass prairies remnants between St. Malo and the United States border on August 30, or in the eight remnants surveyed September 1 in the Woodmore/Tolstoi/Gardenton area.

Staff of the Manitoba Tall Grass Prairie Preserve were made aware of the potential presence of western ironweed in the Preserve's many wet meadows, mesic prairies, and riparian areas, but did not observe the species in 2005. Furthermore, staff do not recall observing the species at any point since vegetation surveys began in 1995 (Laura Reeves, Manitoba Tall Grass Prairie Preserve, pers. comm.)

Recommendations

Future Research

The three known Manitoba occurrences are all riparian, and field visits to these sites revealed that summer flooding had prevented the growth of most non-woody riparian species. While very little (none?) high quality habitat exists in the vicinity of the 3 known occurrences, western ironweed should not be considered extirpated from these sites until surveys are completed in a more typical growing season. Given the large, showy nature of this species, focussed communication through pamphlets or posters may result in increased local awareness of the potential presence of this species and result in the reporting of ironweed locations.

Management

Provincial and/or municipal maintenance staff in the Morris area should be made aware of the potential presence of western ironweed and other rare species in road allowances. Proposed riverbank development or stabilization projects should consider effects on rare riparian species, and include plans for surveys, minimal disturbance and/or restoration.

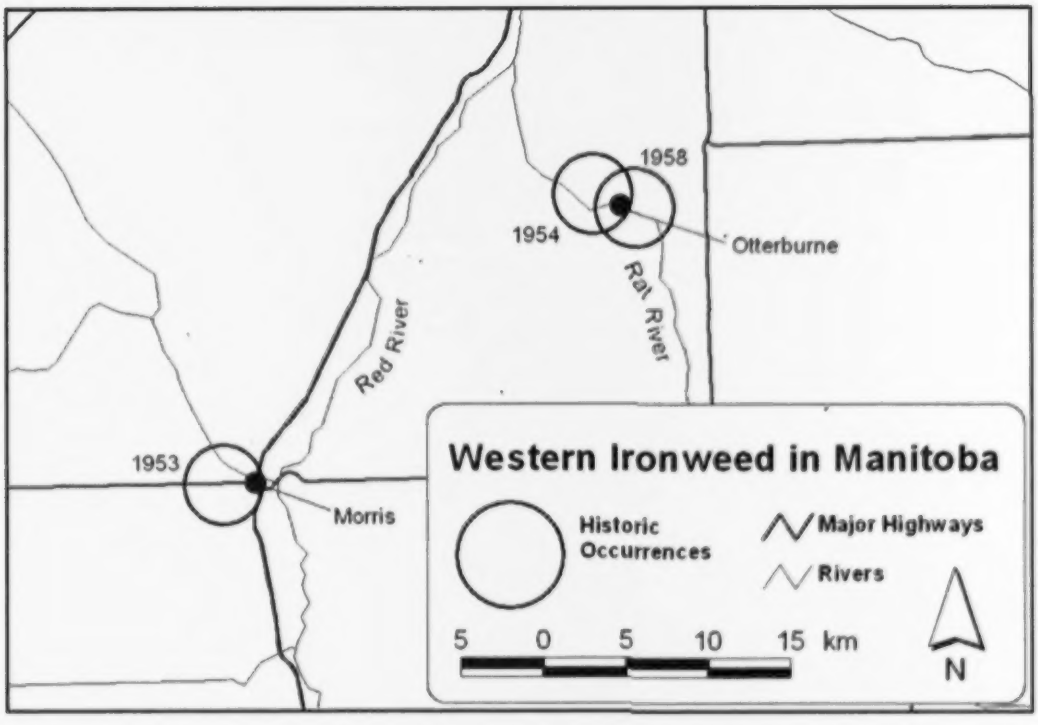


Figure 5. Historic occurrences of western ironweed in south-central Manitoba. The species was not observed in 2005.

Hairy prairie-clover (*Dalea villosa* var. *villosa*)

G5T5, N2, S2, SARA: Threatened

Hairy prairie-clover (family Fabaceae) is a perennial plant with few to many spreading, woody stems. Stems and leaves are covered with fine silvery silky hairs. Each leaf consists of 7-17 leaflets. Pinkish purple flowers are packed into dense spikes at the top of stems and appear from late July to mid-August.

Hairy prairie-clover ranges from Manitoba and Saskatchewan east to Michigan, south to Texas and west to Montana. It is considered very rare in the northwest portion of its range in Saskatchewan, Montana and Wyoming. In Canada hairy prairie-clover is restricted to open to partially stabilized sandhills. Generally, it prefers south to southwest facing slopes. Manitoba's populations are limited to the south-western and south-central sandhills where plants may be found in pastures and along roadsides.

Status & Threats

Hairy prairie-clover is listed as Threatened under Canada's *Species at Risk Act*. Although its conservation status has not been assessed in the United States it is considered secure globally, likely due to its relatively wide range (NatureServe 2006).

Stabilization of sandhills by encroaching vegetation threatens hairy prairie-clover survival by reducing the amount of open sand available. Disturbances such as livestock traffic and fire may help prevent vegetation from encroaching into open areas. The rapid spread of the invasive plant leafy spurge (*Euphorbia esula*) into habitat occupied by hairy prairie-clover is also a major concern. Road allowance maintenance activities, such as herbicide spraying and late summer mowing threaten roadside populations.

Data Collected in 2005

The CDC has not conducted focussed hairy prairie-clover surveys since 2001 (Reimer & Hamel 2002, Hughes 2001). Surveys of hairy prairie-clover in 2005 were aimed at collecting more detailed data from known populations near Treesbank and the Lauder Sandhills (Fig. 6). Data for hairy prairie-clover at Shilo Military Reserve was also updated in 2005 by two summer students employed by of the Department of National Defence.

On July 27, August 16, and September 21, a large fragmented population spanning portions of ten quarter sections near Treesbank was surveyed. Estimating numbers of hairy prairie-clover plants is very difficult as it is often difficult to determine where one plant ends and another begins. Saskatchewan and Manitoba use the "20 cm rule" for the sake of consistency. Stems separated by 20 cm or more are considered separate plants. Individual patches of plants were mapped and the number of individual plants was estimated within each patch. The number of plants in this population was roughly estimated at approaching 10 000.

Hairy prairie-clover most abundant along ridges and in bowl formations co-occurring with creeping juniper (*Juniperus horizontalis*) and shrub lichens (*Cladina* spp.). In some areas higher abundance was noted in the open sand along cattle trails. One suitable quarter section, however, was very heavily grazed and only two patches of hairy prairie clover were found. One of the hairy prairie-clover plants at this location appeared to have been grazed. Saskatchewan surveys of hairy prairie clover noted few plants grazed by cattle and some plants that had been spit out. Herbivory by rabbits was found to be more common. Grazed hairy prairie-clover plants were not observed at any of the other sites surveyed in the Treesbank pastures. Limited aspen encroachment into open areas was observed at some sites. Invasion by leafy spurge was pronounced. Leafy spurge was most abundant on east facing slopes whereas hairy prairie-clover tended to be most abundant on west and south-west facing slopes.

Surveys carried out on July 27 were much more efficient than those in mid-August and September as it was much more difficult to see hairy prairie-clover after the peak blooming period had ended. The silvery color of its divided leaves also makes it very similar in appearance to pasture sage (*Artemisia frigida*) from a distance.

Collections of hairy prairie-clover at Shilo Military Reserve date back to 1943. It has been collected at both the northern boundary and the southeast corner where populations of hairy prairie-clover are still in existence (Sherry Punak-Murphy, pers. comm.). Based on observations in 2001, 2004 and 2005, Shilo is estimated to support one to several thousand hairy prairie-clover plants. Leafy spurge is present at both the northern and southeastern sites. Biocontrol sites have been created in the southeast corner with limited success (Sherry Punak-Murphy, pers. comm.).

Prior to 2005 surveys, 10 modern occurrences were known from the Lauder Sandhills area of southwestern Manitoba. Seven of these were resurveyed on July 28 and August 17. As a result of improved information due to these surveys, five of these surveyed occurrences were combined into two. Aspen and leafy spurge encroachment into hairy prairie-clover patches was observed at all four of the Lauder Sandhills populations surveyed. A portion of one population, located in a road allowance, had been recently sprayed with a broad-leaf herbicide (personal observation confirmed through conversation with responsible staff). At least two of the Lauder Sandhills populations were observed to be larger than what is represented in the CDC's rare species database; these populations extend onto private land for which access permission had not been sought.

A small population, limited to one sandy bowl formation near Deleau, was surveyed on August 17. Aspen encroachment of the sandhills in this area was extensive, but no leafy spurge was evident.

Recommendations

Future Research

Leafy spurge is rapidly invading Manitoba's sandhill habitats. Its effect on hairy prairie-clover is currently unknown. Monitoring of emerging patterns via mapping of plants may provide some insight into the threat of leafy spurge. The effects of cattle operations on hairy prairie-clover also require research as numerous sites are currently used for pasture.

The Lauder Sandhills has not been intensively surveyed for hairy prairie-clover. Surveys of private lands and Wildlife Management Areas in the area will provide a more complete picture of the species' extent. A number of dry and abandoned oil wells exist in the Lauder Sandhills; should oil development re-occur in the area complete data on the extent of Species at Risk occurrences will be required to allow for environmentally sensitive placement of wells.

Management

Based on available data, it appears that light to moderate stocking of cattle may benefit hairy prairie-clover by preventing vegetation from stabilizing open sand. However, the degree to which cattle may be grazing hairy prairie-clover is currently unknown. Leafy spurge control would also be prudent. The spurge leaf roller (*Lobesia euphorbiana*) was observed to be feeding on leafy spurge in some areas. The spurge beetles of the *Apthona* genus have been the most successful particularly on open south-facing sandy hillsides (Mixed-grass Prairie Stewardship Program, undated). Conversely, herbicides have been shown to be effective but short-lived. Non-selective herbicides will kill surrounding vegetation and one type (Picloram) is not recommended for sandy soils as it is slow to break down and movement in ground water can be considerable (Mixed-grass Prairie Stewardship Program, undated).

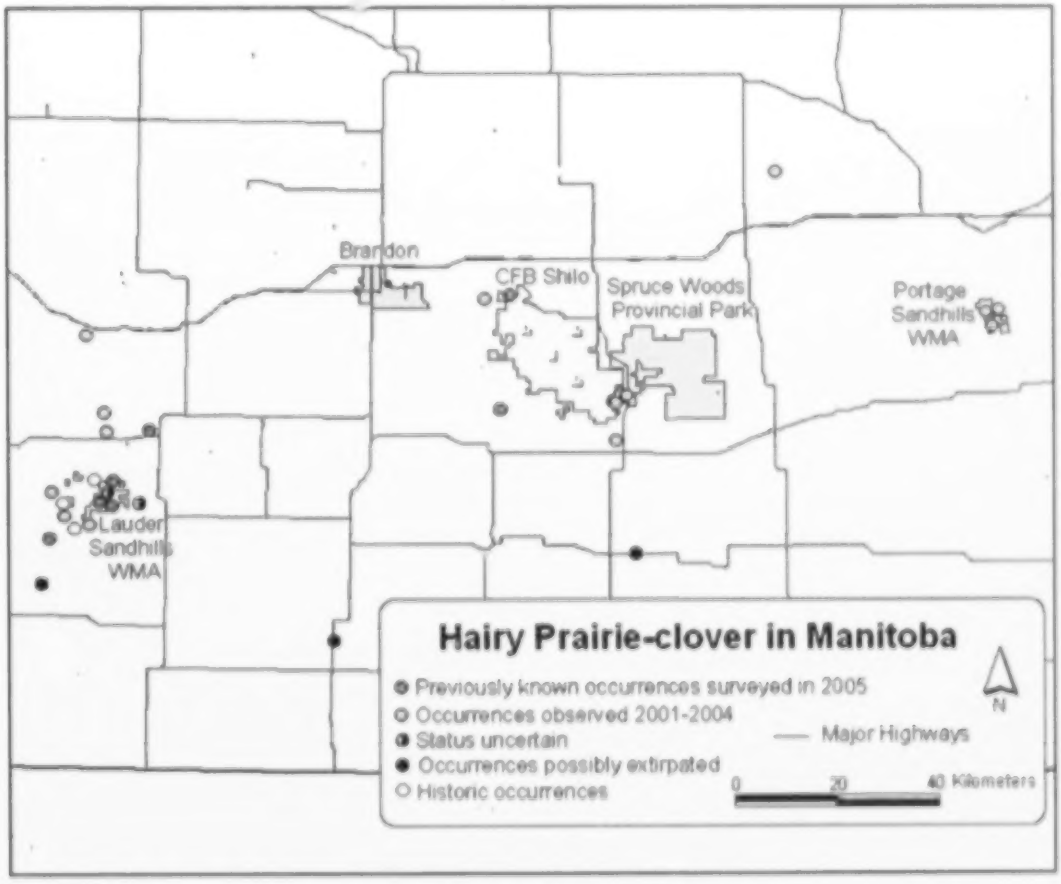


Figure 6. Occurrences of Hairy prairie-clover (*Dalea villosa*) in Manitoba.

Iowa golden saxifrage (*Chrysosplenium iowense*)

G3, N3, S1?

Iowa golden saxifrage (family Saxifragaceae) is a small (3-15 cm) tall yellowish green herbaceous perennial. The leaves are lobed and borne on stalks from the base and along the stem. The tiny (3-5 mm) yellowish flowers are clustered at the stems tips. Brownish seeds are held in capsules that open to form a splash cup from which seeds are dispersed when hit by rain drops.

Iowa golden saxifrage has a limited range. It occurs in two states (Minnesota and Iowa) (NatureServe 2006) and four provinces (Manitoba to British Columbia) (CESCC, in prep.). It is restricted to cool, moist nitrogen rich micro-habitats. Populations in the US occur in areas not covered by ice during the last ice age and are often associated with cold groundwater seeps or ice caves (NatureServe 2006).

Status & Threats

Iowa golden saxifrage is rare in Manitoba, Saskatchewan and British Columbia. Its General Status rank is Vulnerable in Alberta and Canada (CESCC, in prep). It is also considered vulnerable globally (NatureServe 2006). Its specific microhabitat requirements suggest that it has always been somewhat rare (NatureServe 2006). In Manitoba, specimens have been collected from Duck Mountain Provincial Park and Porcupine Provincial Forest (Fig. 7). It has also been reported from Riding Mountain National Park. Potential threats to populations in Duck Mountain Provincial Park and Porcupine Provincial Forest include logging, cottage development, and drainage alteration.

Data Collected in 2005

Herbarium specimens of Iowa golden saxifrage have been collected from Porcupine Provincial Forest in two areas. On July 13, CDC staff attempted to relocate these populations but the roads were impassable. Two new sites in the vicinity were searched unsuccessfully. On July 14 it was searched for in three previously known areas and one new site in Duck Mountain Provincial Park. It was found in one of the known areas growing along a small stream near a lakeshore. The surrounding forest was black spruce. Species indicative of nitrogen rich areas such as alders (*Alnus* sp.) and stinging nettle (*Urtica dioica*) were growing along the stream. Less than 50 plants were found just past a point in the stream where it appears from underground. Some plants were also growing in a small earthen cavity at the edge of the stream along with the common fragile fern (*Cystopteris fragilis*).

Iowa golden saxifrage in a small cave.

Recommendations

Future Research

Prior to 2005 the last known observation of Iowa golden saxifrage in Manitoba was in 1978. Directions on herbarium labels are sometimes very general and landscapes have changed. Efforts to find previously known and new populations should continue as there is a lack of population abundance and distribution data across its range.

Management

Areas supporting Iowa golden saxifrage should be protected from development and resource extraction. Activities that result in changed hydrology or water chemistry should be monitored for their impacts on Iowa golden saxifrage populations. Use of populated areas for educational purposes is not recommended due to the fragility of its habitat (NatureServe 2006).

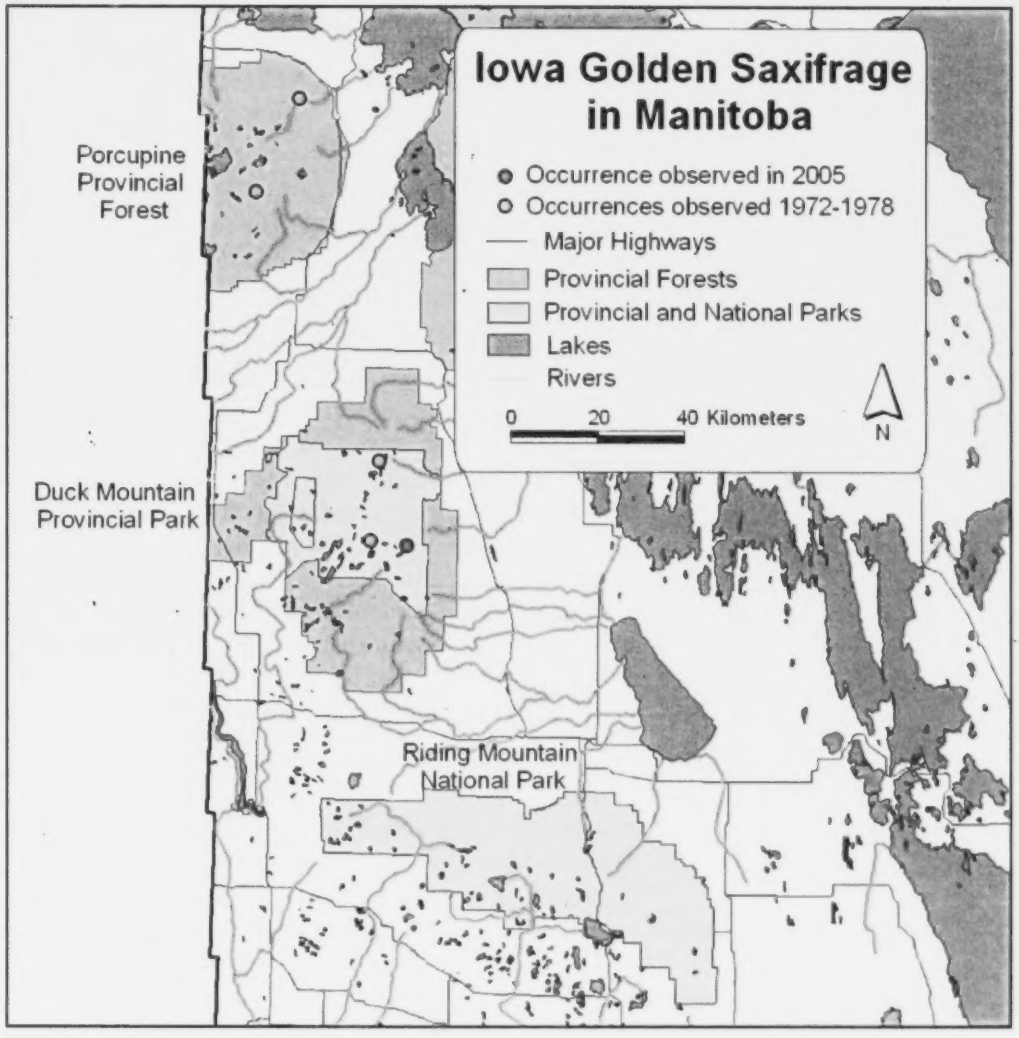


Figure 7. Occurrences of Iowa golden saxifrage (*Chrysosplenium iowense*) in Manitoba.

Riddell's goldenrod (*Oligoneuron riddellii*)

G5, N3, S2, SARA: Special Concern, MESA: Threatened

Riddell's goldenrod (family Asteraceae) is a perennial with erect stems 40 to 100 cm tall (Zhang et al. 2000). The linear, tapered leaves are curved backwards and usually three-veined. The yellow inflorescence is flat-topped to rounded. Flowering occurs from late August to early September. Riddell's goldenrod can hybridise with both stiff goldenrod (*Solidago rigida*) and white upland aster (*Solidago ptarmicoides*). This species is also known as *Solidago riddellii* (Kartesz 1999).

The species occurs on moist to wet calcareous sandy loam soils along relatively undisturbed roadsides, in tallgrass prairie, and in open shrubby fens. In Manitoba, populations occur from the Giroux/Kleefeld area south to the Minnesota border. Populations are concentrated in the Kleefeld, Gardenton, and Green Ridge areas.

Status & Threats

While Riddell's goldenrod is legally protected under Manitoba's *Endangered Species Act*, permanent habitat protection exists only for populations at the Manitoba Tall Grass Prairie Preserve. Most other populations are on private land or in road or railway allowances. Populations in road allowances may be at risk from maintenance activities such as haying, spraying of herbicides, drainage improvement, and trenching or digging activities conducted by municipalities or utility companies. Occasionally, adjacent landowners hay or cultivate road allowances as well.

Data Collected in 2005

All known occurrences in the RM of Franklin (seven) and four occurrences in the RM of Stuartburn were surveyed on August 30 and September 1 (Fig. 8). These occurrences were last surveyed between 1996 and 1998 as part of intensive CDC surveys.

Eight extant populations were observed. Two populations that were previously thought to be separate were combined into one occurrence due to the discovery of intervening subpopulations. Four of the extant populations surveyed were limited to remnant road allowance tallgrass prairie/calcareous fen habitats. The fields adjacent to these populations are unlikely to support Riddell's goldenrod due to intensive agricultural use (e.g. cropland, non-native forage). No road allowance population supported more than 250 stems, and one population consisted of one stem.

Population estimates for the other four extant occurrences surveyed in 2005 could not be made because they extended from road allowances onto adjacent unsurveyed private land.

Riddell's goldenrod could not be relocated at two of the eleven occurrences surveyed. Both populations had extremely small population sizes when last surveyed (less than four stems).

Two of the populations surveyed in 2005 had been impacted by severe road allowance habitat degredation due, respectively, to ditch cleaning and utility line installation. Woody encroachment by willow shrubs (*Salix* sp.) and trembling aspen (*Populus tremuloides*) was identified as a threat at one site. Recent haying was observed at a number of sites, but was normally limited to a single strip along the road. Hybridisation with white upland aster (*Solidago ptarmicoides*) was observed at several sites.

Since the intensive CDC surveys that occurred from 1996-1998, three new Riddell's goldenrod occurrences have been discovered. Five populations may have been extirpated (Table 3).

Higgs (2000) reported the presence of Riddell's goldenrod at a location within St. Malo Wildlife Management Area. CDC staff searched the site on August 30, but did not observe the species.

Table 3. The status of Riddell's Goldenrod occurrences in Manitoba.

Survey Site	First Observed	Last Observed	Last Surveyed	Notes
Occurrences recently verified as extant				
1 RM of Franklin	1997	2005	2005	Road allowance.
2 RM of Franklin	1997	2005	2005	Road allowance, 1 stem in 2005.
3 RM of Franklin	1997	2005	2005	Road allowance and private land.
4 RM of Franklin	1997	2005	2005	Road allowance, portion of population lost due to ditch cleaning.
5 RM of Franklin	1996	2005	2005	Road allowance and private land, >1000 stems.
6 RM of Stuartburn - southwestern	1998	2005	2005	Road allowance and private land.
7 RM of Stuartburn - southwestern	1998	2005	2005	Road allowance.
8 RM of Stuartburn - southwestern	1998	2005	2005	Road allowance and private land, portion of population lost to utility line installation in ditch.
9 Tall Grass Prairie Preserve	1992	2005	2005	Ongoing monitoring by Preserve staff.
10 Tall Grass Prairie Preserve	1992	2005	2005	Ongoing monitoring by Preserve staff.
11 Tall Grass Prairie Preserve	1992	2005	2005	Ongoing monitoring by Preserve staff.
12 Tall Grass Prairie Preserve	1992	2005	2005	Ongoing monitoring by Preserve staff.
13 RM of Stuartburn - north of Vita	2003	2003	2003	
14 RM of Stuartburn - southwestern	1998	2003	2003	
15 RM of Stuartburn - southwestern	2003	2003	2003	
16 RM of Stuartburn - southwestern	1997	2002	2002	
17 Giroux area	1996	2001	2001	Railway allowance.
18 Kleefeld area	1997	2001	2001	Portion of site herbicided in 2001.
19 Kleefeld area	2001	2001	2001	
Occurrences for which current status is unknown				
20 RM of Stuartburn - southwestern	1998	1998	1998	Has not been surveyed since 1998. 8 stems.
Occurrences that are possibly extirpated				
21 RM of Franklin	1997	1997	2005	Only 3 stems present in 1997, at edge of road surface.
22 RM of Franklin	1997	1997	2005	Only 1 stem present in 1997.
23 RM of Stuartburn - southwestern	1998	1998	2003	Only 2 stems present in 1998.
24 Kleefeld area	1958	1997	2001	Ditch may have been regraded since 1997. Only 1 stem observed in 1997.
25 Kleefeld area	1997	1997	2001	Possible hybrids (*S. riddellii* X *S. ptarmicoides*) present in 2001.
Historic occurrences				
26 Kleefeld area	1954	1954	1998	Exact location unknown, may be same as nearby occurrences. Road rebuilt after 1997 flood.
27 Kleefeld area	1956-1958	1956-1958	1998	Exact location unknown, may be same as nearby occurrences. Road rebuilt after 1997 flood. Unsure of original collection date.

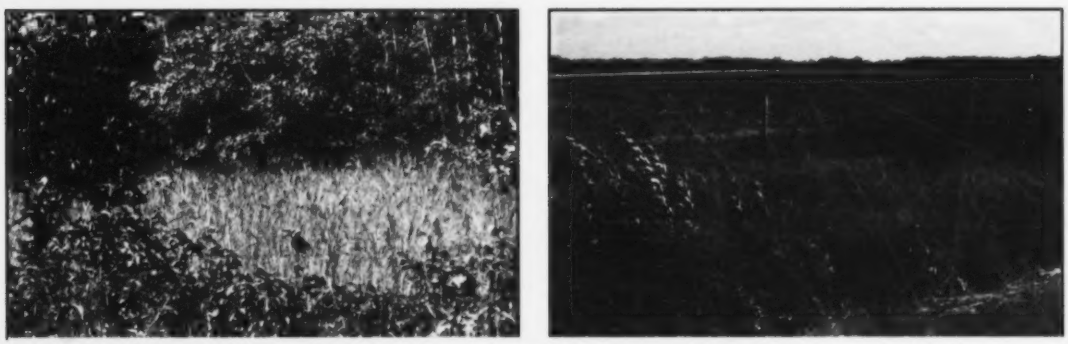
Recommendations

Future Research

Regular monitoring of known populations, potentially extirpated populations and threats should continue. The full extent of road allowance populations that extend onto adjacent private lands supporting native prairie should be determined.

Management

Protection of remaining road allowance populations is necessary. Portions of two populations were destroyed in 2005 due to destruction of road allowance habitat. Other than populations at the Manitoba Tall Grass Prairie Preserve, no populations are protected from habitat destruction via conservation ownership or easement. Discussions with local road maintenance managers and Rural Municipality councils should be initiated in order to increase local awareness of the presence of Riddell's goldenrod in road allowances and to present available stewardship options. Stewardship options include delaying mowing and haying until after seed set, avoiding the use of herbicides, and careful road and ditch maintenance activities in the vicinity of known populations. A Species at Risk fact sheet was produced for Riddell's goldenrod in 2006.



Riddell's goldenrod habitat. Left: a tallgrass prairie opening adjacent to a road allowance in the RM of Stuartburn. Right: a calcareous fen-like habitat remnant in a road allowance in the RM of Franklin.

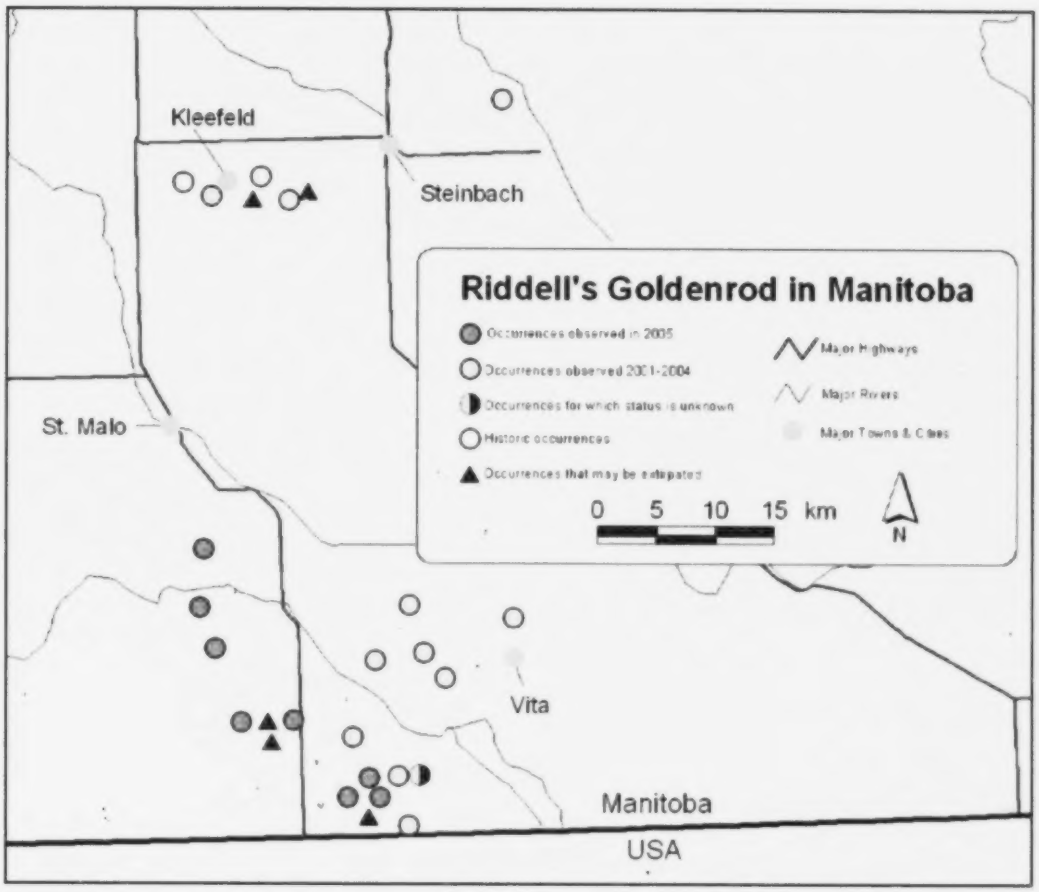


Figure 8. Occurrences of Riddell's goldenrod (*Oligoneuron riddellii*) in Manitoba.

Small white lady's-slipper (*Cypripedium candidum*)

G4, N2, S1, SARA & MESA: Endangered

Small white lady's-slipper (family Orchidaceae) is a herbaceous perennial that grows to a height of 10 to 35 cm. Plants grow in clumps of few to many stems, each with two to four leaves. Flowers consist of a small (less than 2.5 cm long) white pouch-shaped "slipper" with purplish veins or spots particularly inside. The surrounding twisted, greenish-yellow petals and sepals are often streaked or spotted with purple. Flowering usually occurs between mid May and mid June but varies with weather.

Small white lady's-slipper is not secure in any part of its range, which extends from Ontario and Manitoba south to Alabama (NatureServe 2006). In Manitoba, small white lady's-slipper grows in moist calcareous prairies and openings in wooded grasslands. It prefers relatively undisturbed grassland, but can also grow in disturbed marginal areas such as roadside ditches.

Status & Threats

Small white lady's-slipper is listed as Endangered under Canada's *Species at Risk Act*, the Manitoba *Endangered Species Act* and the Ontario *Endangered Species Act*. Small white lady's-slipper is considered rare or uncommon throughout its range but overall is considered apparently secure in the United States and globally by NatureServe (2006).

The majority of small white lady's-slipper populations in Manitoba occur on private land or provincial road allowances maintained by rural municipalities. The greatest threats currently facing small white lady's-slipper populations in Manitoba include conversion of native prairie for intensive agricultural, industrial or urban development, drainage projects and herbicide spraying, encroachment by woody species, invasion by weedy species, and hybridisation with yellow lady's-slipper. Hybridisation has been reported for all populations in Manitoba.

Data Collected in 2005

Small white lady's-slipper occurs in three main areas of the province: south of Brandon, the southern Interlake region, and from Kleefeld south to the Tall Grass Prairie Preserve (Fig. 9). The Kleefeld and Brandon areas were surveyed in 2004 (Hamel and Foster, 2005). The Tall Grass Prairie Preserve population is monitored annually by its staff. Surveys of small white lady's-slipper in 2006 were focussed on the southern Interlake region.

Previously known sites

Four populations of small white lady's-slipper were previously known to occur in the southern Interlake region. Three populations were visited by CDC staff and two were visited by University of Winnipeg students. All populations were abundant in comparison to data from previous years.

On June 7, 338 stems (243 flowering) were counted and mapped in a roadside ditch. Several ditches in the area have recently been deepened. On June 9, 266

stems (168 flowering) were counted along an old railbed that has been converted to a hiking trail. Trail managers are aware of this occurrence and have been managing the site by burning or mowing to reduce thatch build up and encroachment of woody species. In 2005 small white lady's-slipper plants at this site were expanding into an area where they had previously not been observed. The largest population known to occur in the Interlake was visited on June 8 and June 13. The total area covered by this population is greater than 60 hectares. A small portion of this population was counted and the total population for this site was roughly estimated to be between 5 000 and 10 000 stems. Fewer yellow lady's-slippers and hybrids were observed at this site than at the other three. University of Winnipeg students visited the fourth site on May 28, June 2 and June 8. They estimated 241 flowering stems of small white lady's-slipper plants and 805 non-flowering stems of unknown lady's-slipper plants (small white, yellow or hybrids).

Searches for new sites

Searches for new small white lady's-slipper populations were carried out in the southern Interlake region. The four known populations correspond with marked elevation changes. Potential sites in the vicinity of these ridges were determined by consulting land use and soils maps, and aerial photos.

Over 20 search hours were spent looking for small white lady's-slipper at 15 sites. All sites were on private land except one that was a crown lease. Over 200 miles (322 km) of ditches in the vicinity of searched sites were checked from a slow moving vehicle.

One new population was found on private land approximately two kilometres from the largest known population in the Interlake. A total of 1938 small white lady's-slipper stems (1413 flowering) were counted in an area of approximately 80 x 20 m. There were approximately 333 relatively distinct clumps and it is likely that some non-flowering stems were missed in the thick layer of thatch so the actual number of small white lady's-slipper plants was likely more than 333. The property is native prairie that has never been broken. Peak blooming date of this population was later than that of the population two kilometres away which is regularly hayed. A late frost in May 1998 killed small white lady's-slipper flowers at the hayed site. The later blooming period on the non-hayed property is likely due to thicker thatch and may afford some protection against damage from late frosts.

Recommendations

Future Research

Small white lady's-slipper numbers and flowering fluctuate greatly from year to year. Monitoring of small white lady's-slipper population trends is confounded by lengthy life cycles, long periods of dormancy, environmental conditions and management regimes. Furthermore, conditions that promote flowering may not promote increases in stem numbers (Falb and Leopold 1993). Small white lady's-slipper also has a very short blooming period making it difficult to monitor populations when resources are limited. Standard methods for long-term monitoring of population trends are needed in addition to studies that address effects of climate and various management regimes.

Hybrids between small white lady's-slipper and yellow lady's-slipper have been recorded at all known small white lady's-slipper populations in Manitoba. Research is needed to assess the threat of hybridisation on the genetic integrity and survival of small white lady's-slipper.

A many-stemmed clump of hybrids in the Interlake.

Management

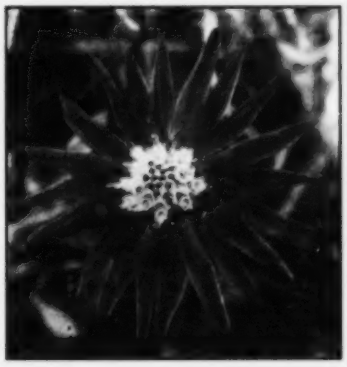
The effects of various management regimes on small white lady's-slipper populations in Manitoba are not well documented. Prescribed fire, mowing and grazing have been used at different sites at different times of the year. Employment of different management regimes at different sites in the same region could safe guard against extreme environmental conditions. For example, an early burn followed by warm temperatures may promote early flowering thereby increasing the risk of damage by late frosts (Bowles 1983). Effects of various management regimes and their interactions with environmental conditions need to be well documented and communicated so that successful management techniques can be confidently employed at appropriate sites. A draft National Recovery Strategy for small white lady's-slipper is currently being reviewed.

Figure 9. Occurrences of small white lady's-slipper (*Cypripedium candidum*) in Manitoba.

Western silvery aster (*Symphyotrichum sericeum*)

G5, N2, S2, SARA & MESA: Threatened

Western silvery aster (family Asteraceae) is a herbaceous perennial that grows to a height of 30 to 70 cm. Each plant consists of one to many stems. The lance-shaped leaves are covered with soft silvery hairs. Most lower leaves die and fall off by the time flowering occurs. The purplish flowers appear from August to mid-September.



Western silvery aster is widespread from Manitoba, south to Texas and east to Virginia. In Canada it occurs in Manitoba from the US border to northeast of Winnipeg and at two locations in northwestern Ontario. Manitoba's western silvery habitat is characterized by dry prairies and woodland openings. It typically grows on gravelly or sandy, well drained, calcareous soil. Populations persist in relatively undisturbed grasslands as well as disturbed sites such as roadside ditches and adjacent to gravel pits.

Status & Threats

Western silvery aster is listed as Threatened under Canada's *Species at Risk Act* and the Manitoba *Endangered Species Act*. It is listed as Endangered under the Ontario *Endangered Species Act*. It is considered secure in the United States and globally as it only becomes rare in the northern and eastern portions of its range (NatureServe 2006).

A large proportion of western silvery aster populations in Manitoba occur adjacent to gravel pits, thus gravel extraction poses a threat. Other potential threats to western silvery aster populations in Manitoba include conversion of native prairie for development, drainage projects and herbicide spraying, and encroachment by woody species.

Data Collected in 2005

The main range of western silvery aster in Manitoba extends from Birds Hill Provincial Park to the US border (Fig. 10). On September 7, three known sites in Birds Hill Provincial Park were visited with Parks staff. Scattered plants were found at each of the three sites. Leafy spurge (*Euphorbia esula*) co-occurred with western silvery aster at one site and may pose a threat if it proliferates. Park staff were provided with a map of the known western silvery aster sites in Birds Hill Provincial Park and were asked to notify the CDC if additional sites are found.

Two known populations near Beausejour were surveyed by CDC staff on September 8 and 17. One population was discovered by the landowner in 1993 in an area that had been cultivated and sprayed. The population consisted of approximately 20 plants. Native and non-native plants were planted and seeded in 1995 and 1998. The area was mowed in 1999 and 2004. In 2005 the landowner estimated approximately 150 plants. More plants were observed in areas with a higher proportion of dicots than in grassier mowed areas. The landowner also noted that western silvery aster was shorter in 2005 and does not plan to mow

again. Western silvery aster had also been reported from the adjacent property in 1999 but none were found in 2005.

Western silvery aster was very abundant at the other population near Beausejour. Plants were not counted but the number of stems was roughly estimated at approximately 20 000. It occurs on private land owned by two different landowners, as well as in the intervening ditches. Western silvery aster on one parcel was one of the dominant plants, growing not only in open areas but in shade under aspen and oak as well. Plant diversity was very high on this parcel with few exotic species. The other parcel had been previously cultivated in one area and grazed in another, thus was less diverse with more exotic species and bare ground. Western silvery aster was less abundant on the previously cultivated portion and in areas with dense big blue stem (*Andropogon gerardii*). Smooth brome (*Bromus inermis*), a potentially invasive grass, and western silvery aster were found growing together in disturbed areas on both parcels. Western silvery aster growing in the ditches was associated with rocky areas and very little other vegetation.

Recommendations

Future Research

Surveys carried out in 2004 (Hamel and Foster 2005) and 2005 support the view that western silvery aster is able to tolerate some disturbance (Semple 1988). Further research is needed to determine the response of western silvery aster to various types of disturbance and its possible role in gravel pit reclamation.

Management

Appropriate management techniques for western silvery aster need to be determined, monitored and communicated with land managers. Manitoba and Ontario are currently preparing a National Recovery Strategy for western silvery aster.

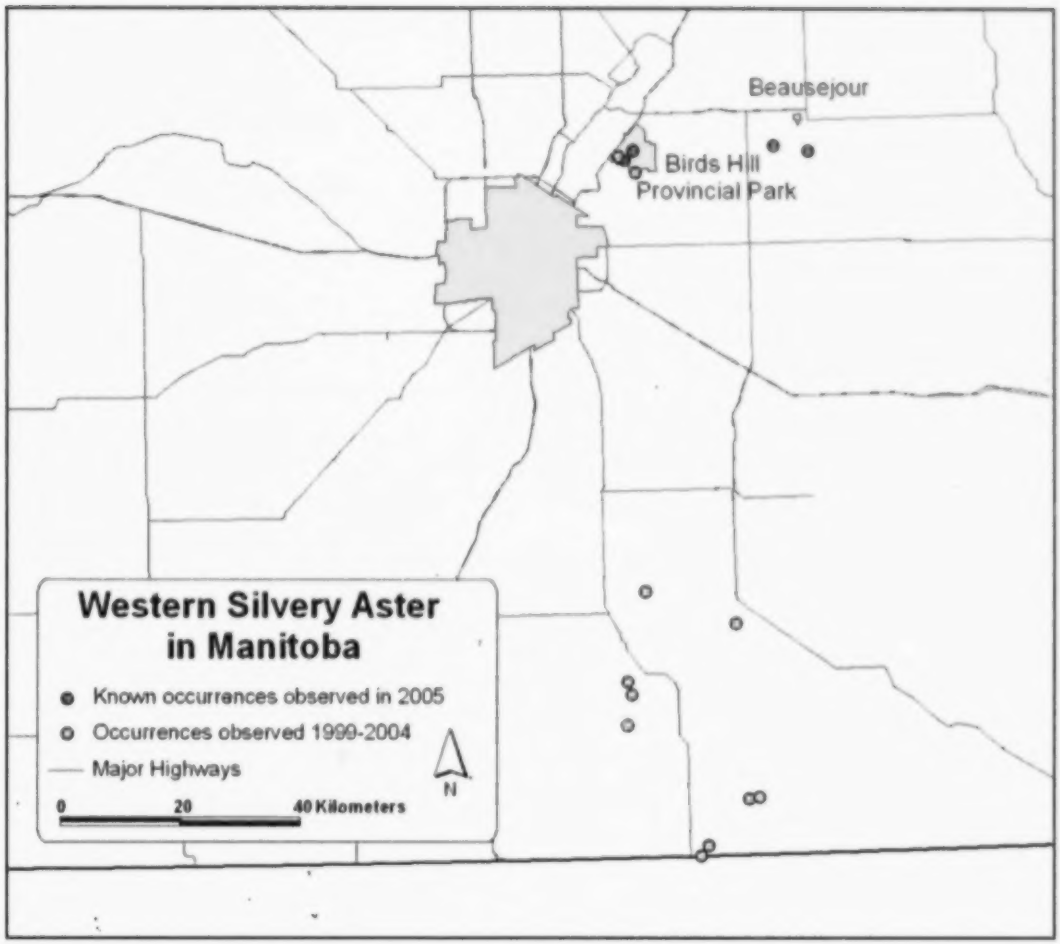


Figure 10. Occurrences of western silvery aster (*Symphyotrichum sericeum*) in Manitoba.

Part 2: Other Rare and Uncommon Species Surveyed

Wild ginger (*Asarum canadense* G5, N5, S3?)

Wild ginger is a somewhat uncommon plant traditionally collected for medicinal purposes by Native Americans. It was encountered at four sites while surveying for bloodroot. One site was in Sandilands Provincial Forest and the other three were found along the Whitemouth River.

Tussock sedge (*Carex stricta* G5, NNR, S1)

Tussock sedge was recently discovered in Manitoba. Only one occurrence had been confirmed. Tussock sedge was collected from Rembrandt WMA in the South Interlake on July 6. It was locally abundant in an open area sloping towards a tamarack stand. This is the most northwestern occurrence of this species known to date. The specimen has been submitted to the University of Manitoba for confirmation.

Smooth cliff-brake (*Pellaea glabella* G5, N4N5, S2)

Smooth cliff-brake was collected at Marble Ridge in the South Interlake on July 6. It was found growing in crevices on east facing limestone cliffs several meters high. This fern species is restricted to limestone outcrops. Gastony's cliff-brake (*Pellaea gastonyi*), a closely related rare species, also grows in this area.

Smooth cliff-brake viewed from above limestone cliff.

Marsh alkali aster (*Almutaster pauciflorus* G4, NNR, S3)

Marsh alkali aster was collected in a fen in a hydro right of way south of Devil's Lake in the Interlake region on July 12. It was collected again from a fen-like ditch while surveying Riddell's goldenrod on September 1. Few occurrences of this species have been documented in Manitoba. It is considered a Sensitive species in Canada (CESCC, in prep.). Previously it had only been known from west of Lake Manitoba and Lake Winnipegosis. Both specimens have been submitted to the University of Manitoba for confirmation.

Northern spikemoss (*Selaginella selaginoides* G5, NNR, S2)

Northern spikemoss was also collected from the fen south of Devil's Lake. It may be under recorded due to its small inconspicuous appearance and may prefer specialized habitats such as wet, alkaline areas.

English sundew (*Drosera anglica* G5, NNR, S3)

This carnivorous plant was collected from a calcareous seepage fen surrounded by a black spruce bog south of Grand Rapids on July 13. It was locally abundant on mossy hummocks within the small fen.

White beak sedge (*Rhynchospora alba* G5, NNR, S3?)

White beak sedge was also collected from the calcareous seepage fen south of Grand Rapids. Since first being recorded in Manitoba in the 1980's several occurrences have been found.

Geyer's spurge (*Chamaecyse geyeri* G5, N2, S1)

Geyer's spurge was collected from two sites in southwestern Manitoba near Lauder sandhills on July 28 and August 17. These are the first collections of this species in Manitoba since 1960. It also occurs in Saskatchewan and is considered a Sensitive species in Canada (CESCC, in prep.).

Sand bluestem (*Andropogon hallii* G4, NNR, S2)

Sand bluestem is a relatively common grass in some sandhill areas of southwestern Manitoba and was observed while surveying hairy prairie-clover. It is not known to be native to any other province or territory in Canada and is therefore given a General Status rank of 2 (May be at Risk) (CESCC, in prep.).

Schweinitz's flatsedge (*Cyperus schweinitzii* G5, NNR, S2)

This species is also relatively common in some sandhill areas of southwestern Manitoba and was observed while surveying hairy prairie-clover. It occurs more commonly in Ontario than the three prairie provinces and is considered a Sensitive species in Canada (CESCC, in prep.).

Prairie lungwort (*Mertensia lanceolata* G5, NNR, S2)

Few occurrences have been recorded for this rare species in prairie habitats in southwestern Manitoba. It was collected on June 29 while surveying buffalo grass in the Souris River Valley. In Canada it only occurs in the prairie provinces and is considered a Sensitive species (CESCC, in prep.).

Large-fruited parsley (*Lomatium macrocarpum* G5, NNR, S3)

Large-fruited parsley was collected on June 29 from the Souris River valley while surveying buffalo grass. This species reaches the northeastern limit of its range in southwestern Manitoba.

Yellow umbrella-plant (*Eriogonum flavum* G5, N5, S3)

Yellow umbrella-plant was also collected on June 29 from the Souris River valley and reaches the northeastern limit of its range in southwestern Manitoba.

Virginia virgin's bower (*Clematis virginiana* G5, NNR, S2)

This rare vine reaches the northwestern limit of its range in Manitoba where it has been recorded from few locations. On August 30 it was found climbing a chokecherry tree (*Prunus virginiana*) along with a climbing bittersweet vine (*Celastrus scandens*) in riparian forest along the Roseau River near Senkiw.

Slender agalinis (*Agalinis tenuifolia* G5, NNR, S2S3)

Slender agalinis was found while looking for Culver's root in the RM of Hanover on August 12. It was also found on August 30 in the St. Malo Wildlife Management Area

and along the banks of the Roseau River near Senkiw. It reaches the northwestern limit of its range in calcareous areas of southeastern Manitoba.

White turtlehead (*Chelone glabra* G5, NNR, S2S3)

This species reaches the western limit of its range in Manitoba where it has been recorded from relatively few locations. A previously known occurrence was observed and updated on August 25.

Pincushion cactus (*Coryphantha vivipara* G5, NNR, S2)

Two species of cacti grow in Manitoba. Prickly-pear cactus (*Opuntia fragilis*) is relatively common in appropriate habitats whereas pincushion cactus is rare. A new occurrence of pincushion cactus was documented in the Lauder Sandhills on September 21.

Northern prairie skink (*Eumeces septentrionalis* G5, NNR, S2)

This reptile is listed as Endangered under the federal Species at Risk Act. On July 28 it was observed in an area of the Lauder Sandhills Wildlife Management Area where it was also observed in 2001.

Dwarf water-lily (*Nymphaea liebergii,* G5, N5, S4)

Attempts to survey a reported location of dwarf water-lily in Sandilands Provincial Forest were made on August 25. This species is easily confused with the rare pygmy water-lily (*Nymphaea tetragona*). Two potential locations were identified, but the floral characteristics required to distinguish the species from other members of the *Nymphaea* genus were not sufficiently distinct. Further study of the characteristics that distinguish the three species of *Nymphaea* in Manitoba are required (see Hamel and Foster 2005).

Liverleaf (*Hepatica nobilis,* G5, NNR, S1)

Portions of Pembina Hills Provincial Park were searched on April 17, 2005. Despite good understory search conditions (pre-leafing out of shrubs and trees), no liverleaf was observed.

Part 3: Special Survey and Stewardship Initiatives

Negative Data/Search Effort Database

Data about the locations surveyed for rare plant species and the number of search hours involved is a necessary, but often overlooked, component of the species assessment process. Species assessment organizations, such as COSEWIC, are increasingly demanding information about search effort and sites which were surveyed without a positive observation. Habitat characteristics of sites in which a rare species has not been found contribute to our knowledge of specific species requirements. This knowledge can be used when planning future searches. Maintaining negative data can also prevent repetitive visits to sites where the habitat is unsuitable for supporting a particular species and can guide focussed resurveys of sites with suitable habitat.

In 2006, CDC staff created a GIS theme for mapping negative data. For each site mapped, information was entered on species name, specific site directions and description, habitat suitability and whether or not a site revisit is necessary, date surveyed, surveyor name(s), time spent searching, site owner name(s) and comments. In addition to mapping sites where a species was searched for and not found, there are some cases in which a species was observed but not surveyed. For example, a plant may have been observed from the road but the surveyors had no permission to access or a plant was observed but needs to be revisited at a different time of year to confirm its identification when reproductive structures are present. Forty-two sites were mapped this year in which a species was searched for but not found or a species was found but not surveyed.

Road Allowance Species At Risk Map

Rare species that have been extirpated from native prairie by cultivation or other land uses sometimes survive along fence lines and roadside ditches in which suitable native habitat remains. Some rare species populations in such situations can be surprisingly viable, while others are threatened by maintenance activities such as mowing, herbicide spraying, utility line installation, and ditch cleaning. Most road allowance maintenance is carried out by RM staff.

A Rural Municipality supporting a high proportion of provincially and federally listed species occurring in road allowances was chosen for this project. This RM had previously indicated an interest in receiving rare species information. A wall map delimiting RM road allowances supporting rare species was produced. Stewardship recommendations specific to individual road allowances were included. While conserving rare species populations in road allowances is the primary goal of this initiative it is also hoped that new populations will be discovered and reported to the CDC.

Presentations

Presentations were given to the Industrial Vegetation Management Association and the Manitoba Weed Supervisors Association on the identification and stewardship of rare species in road allowances and other edge habitats. Interest in receiving maps of rare species locations were indicated by weed supervisors. Maps that can be easily consulted from a spray truck are likely the most effective means of protecting rare species

occurrences from herbiciding, followed by fact sheets with species descriptions and mitigation measures.

Tallgrass Aspen Parkland Conservation Area Planning

CDC staff continued to co-lead the development of a Conservation Area Plan for the Tallgrass Aspen Parkland, an area that stretches from near Steinbach to northern Minnesota and contains Manitoba's highest concentration of rare plant species and a number of legally protected species. Project partners include the Nature Conservancy of Canada, Manitoba Conservation, The Nature Conservancy (US), and the Minnesota Department of Natural Resources.

Stewardship and Recovery

The data collected by the CDC has been critical to the development of draft national recovery strategies for western prairie fringed orchid (*Platanthera praeclara*), western silvery aster, and small white lady's-slipper. Recovery strategies to be developed for hairy prairie-clover, buffalo grass and western spiderwort (*Tradescantia occidentalis*) will also require up to date information from the CDC. Recommended research and management activities are outlined in the draft recovery strategies. Efforts to prioritize sites for protection, standardize monitoring, develop beneficial management practices, and increase awareness and communication among government agencies are key to the recovery of all plant species at risk in Manitoba.

In recent years botanical surveys by the CDC have been aimed at updating location information, population estimates and threats for known occurrences of listed species. Prioritization of sites for protection is likely feasible from a biological perspective for all of Manitoba's listed plant species.

Standardized counting and population estimate techniques are currently being applied to some Species at Risk in Manitoba. Consensus among all relevant jurisdictions and documentation of standardized methods for broad scale population monitoring of all listed plant species are needed in order to detect rangewide population trends.

Comprehensive species specific information on proven beneficial management practices is a major knowledge gap for Manitoba's rare plant species. Currently the CDC provides information on rare species and results of surveys to land owners and managers. Follow up discussions with land managers about land uses and management practices are required to determine how population trends may be affected by various activities. Landowner Contact Guidelines are currently being developed by the Biodiversity Conservation Section of Manitoba Conservation's Wildlife Branch with input from CDC staff.

Increased sharing of rare species and stewardship information among government departments, local communities and landowners is a necessary first step towards protecting rare species occurrences. Two fact sheets were added to Manitoba's Species at Risk series in 2006 for Riddell's goldenrod and Culver's-root. The format of these fact sheets lends itself to raising awareness in many different situations. Stewardship summaries that provide more detailed information on management and mitigation measures are needed. Communication between government branches and consultants during environmental licensing should also be improved.

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Appendix 1: Definitions of Conservation Status Ranks

Adapted from Manitoba Conservation Data Centre (2006) and NatureServe (2006).

Species are evaluated and ranked by the Conservation Data Centre on the basis of their range-wide (global - G) status, nation-wide (national – N) status, and province-wide (subnational - S) status according to a standardised procedure used by all Conservation Data Centres and Natural Heritage Programs. These ranks are used to determine protection and data collection priorities and are revised as new information becomes available.

For each level of distribution—global, national, and provincial—species are assigned a numeric rank ranging from 1 (very rare) to 5 (secure). This reflects the species' relative endangerment and is based primarily on the number of occurrences of that species globally, nationally, or within the province. However, other information, such as date of collection, degree of habitat threat, geographic distribution patterns and population size and trends, is considered when assigning a rank. The numbers of occurrences listed below are suggestions, not absolute criteria.

Basic Ranks

Rank	Definition
1	Very rare/Critically Imperiled - Critically imperiled because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation or extinction.
2	Rare/Imperiled - Imperiled because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation or extinction.
3	Uncommon/Vulnerable - Vulnerable due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation or extinction.
4	Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
5	Secure—Common, widespread, and abundant.
H	Historical/Possibly Extirpated - Species occurred historically, and there is some possibility that it may be rediscovered.
X	Presumed Extirpated - Species is believed to be extirpated. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
U	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NR	Unranked - Conservation status not yet assessed.

Other Heritage Codes

Code	Definition
G#G# N#N# S#S#	Range Rank - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
?	Inexact or Uncertain - Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)
T#	Infraspecific Taxon - The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank (e.g. G4T3).

Appendix 2: Definitions of General Status Ranks

Adapted from Wild Species 2000: The General Status of Species in Canada (Canadian Endangered Species Conservation Council 2001)

The General Status of Wild Species in Canada is a national initiative aimed at identifying those species that may be in trouble, those for which more information is needed, or those for which a formal status assessment or additional management attention is necessary. Species receive a general status rank in each province, territory, or ocean region in which they are known to be present, as well as an overall Canada-wide general status rank. General status assessments are made by integrating information on population sizes, distributions, trends, and threats to a species across its Canadian range. The CDC's database provided much of the information used to determine general status ranks for Manitoba's plant species.

General status ranks

Rank	Definition
0	Extirpated/Extinct - species that are no longer thought to be present in the province or territory or in Canada (for the case of a national general status rank) or that are believed to be extinct.
1	At Risk - species for which a formal detailed risk assessment (COSEWIC assessment or provincial or territorial equivalent) has been completed and that have been determined to be at risk of extirpation or extinction (i.e., endangered or threatened).
2	May Be At Risk - species that may be at risk of extirpation or extinction and are therefore candidates for a detailed risk assessment by COSEWIC or provincial or territorial equivalents.
3	Sensitive - species that are not believed to be at risk of immediate extirpation or extinction but may require special attention or protection to prevent them from becoming at risk.
4	Secure - species that are not believed to belong in the categories At Risk, May Be At Risk, or Sensitive.
5	Undetermined - species for which insufficient data, information, or knowledge is available with which to reliably evaluate their status.
6	Not Assessed - species that are known or believed to be present regularly in the geographic area in Canada to which the rank applies but have not yet been assessed.
7	Exotic - species that have been moved beyond their natural range as a result of human activity.
8	Accidental - species occurring infrequently and unpredictably, outside their usual range.